Pneumococcal and *Legionella* Urinary Antigen Tests (UAT)

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The clinical microbiology lab recently began performing these tests in-house with a turn-around time of less than one day. Previously these tests were available only as send out tests. Both UAT are recommended by The Infectious Disease Society of America/American Thoracic Society (IDSA/ATS) community-acquired pneumonia (CAP) guidelines to augment other diagnostic strategies.[1] General advantages of UAT's include improved sensitivity over sputum and blood culture, the availability of urine in many patients who are unable to produce sputum, rapid turn-around time, and test remains valid even after initiation of antibiotics. The major disadvantage to these tests is the lack of an organism for further microbiologic testing.

Pneumococcal UAT:

Streptococcus pneumoniae is the most common cause of CAP and a major pathogen in healthcare-associated pneumonia (HCAP). The yield of sputum culture for *S. pneumoniae* rapidly decreases with initiation of antibiotics and after 24 hours fewer than 30% of patients with pneumococcal pneumonia will have positive cultures.[2] Many patients are unable to provide adequate sputum specimens. The Pneumococcal UAT detects *S. pneumoniae* C-polysacharide (a cell wall component) which is present in all serotypes. In a meta-analysis of all currently published trials the pooled sensitivity was 74% (95% CI 72-77%) and the specificity was 94% (95% CI 93-95%) compared to traditional microbiology.[3] Use of the UAT improves diagnostic yield (i.e. increased the number of persons diagnosed with pneumococcal pneumonia) by 23-39%.[3,4]

There are a number of reasons for the increase in diagnostic yield over traditional microbiolgy. As mentioned above, an advantage of the UAT is the ease of availability of urine specimens in situations where sputum may not be able to be produced. Also, the UAT will typically remain positive for up to 3 days after antibiotics are initiated. The IDSA/ATS CAP guidelines recommend the use of pneumococcal UAT in patients with leucopenia, severe liver disease, chronic alcohol abuse, asplenia, pleural effusions, those who fail outpatient therapy, and patients admitted to the ICU.[1] They particularly recommend the use of the pneumococcal UAT in patients who have been initiated on antibiotics. The pneumococcal UAT has decreased specificity in children.

The utility of the pneumococcal UAT in healthcare-associated pneumonia is unclear. Lower respiratory tract and blood cultures are recommended in all patients with HCAP and should be obtained as soon as possible. *S. pneumoniae* is a major pathogen in this population, causing up to 15% of microbiologically defined cases of HCAP, and resulting in an unknown but significant number of infections that go undetected.[5,6] The pneumococcal UAT is useful in HCAP if it is positive as it allows narrowing of antibiotics from broad spectrum to targeted therapy for pneumococci alone.

Legionella UAT:

Culture is the most important technique for the detection of Legionella species and if infection due to these organisms is suspected appropriate cultures should be obtained. The Legionella UAT is the most commonly ordered test for the diagnosis of Legionnaires disease and has a sensitivity of around 70-80% (generally higher than culture), a specificity of >99%, and will usually remain positive for days to weeks after effective treatment is initiated.[7] IDSA/ATS CAP guidelines recommend the use of the *Legionella* UAT in patients with pleural effusions, recent travel, alcohol abuse, failure of outpatient therapy, and patients admitted to the ICU. A disadvantage of the *Legionella* UAT is it only is useful in the detection of disease due to serogroup 1. Approximately 80-95% of *Legionella* infections in the US are due to group 1.

Recommendations for UAT Use:

1. Utilize in patients with CAP as specified by IDSA/ATS guidelines
2. Consider use in patients with healthcare-associated pneumonia as a diagnostic adjunctive test to routine sputum and blood cultures

References:

1. Mandell LA, Wunderink RG, Anzueto A, et al. Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia. *Clin Infect Dis*. 2007;44:S27-72.
2. Musher DM, Montoya R, Wanahita A. Diagnostic value of microscopic examination of gram-stained sputum and sputum cultures in patients with bacteremic pneumococcal pneumonia. *Clin Infect Dis*. 2004;39:165-9.
3. Boulware DR, Daley CL, Merrifield C, et al. Rapid diagnosis of pneumococcal pneumonia among HIV-infected adults with urine antigen detection. *J Infect*. 2007;55:300-9.
4. Ishida T, Hashimoto T, Arita M, et al. A 3-year prospective study of a urinary antigen-detection test for *Streptococcus pneumoniae* in community-acquired pneumonia: Utility and clinical impact on the reported etiology. *J Infect Chemother*. 2004;10:359-63.
5. Nseir S, Grailles G, Soury-Lavergne A, et al. Accuracy of American Thoracic Society/Infectious Disease Society of America criteria in predicting infection or colonization with multidrug-resistant bacteria at intensive-care unit admission. Clin Microbiol Infect. 2009;Aug 20 (epub).
6. Micek ST, Kollef KE, Reichley RM, et al. Health care-associated pneumonia and community-acquired pneumonia: a single-center experience. *Antimicrob Agents Chemother*. 2007;51:3568-73.
7. Helbig JH, Uldum SA, Bernander S, et al. Clinical utility of urinary antigen detection for diagnosis of community-acquired, travel-associated, and nosocomial Legionnaires' disease. *J Clin Micro*. 2003;41:838-40.